3x3x3 LED Cube Arduino Shield

Written By: Joe Hudy

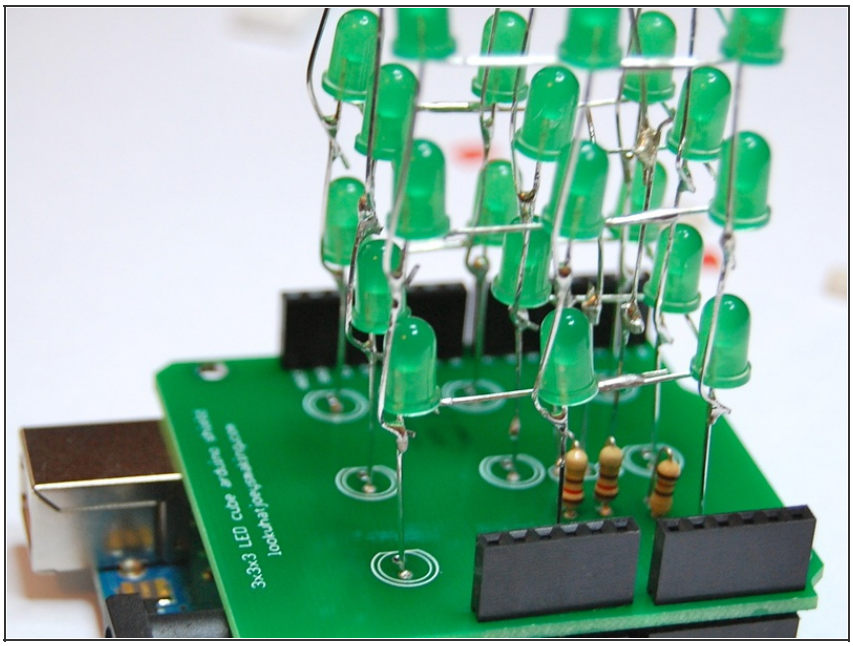
TOOLS:

- Helping hands (1)
- Soldering iron (1)
- Wire cutter/stripper (1)
- safety googles (1)

PARTS:

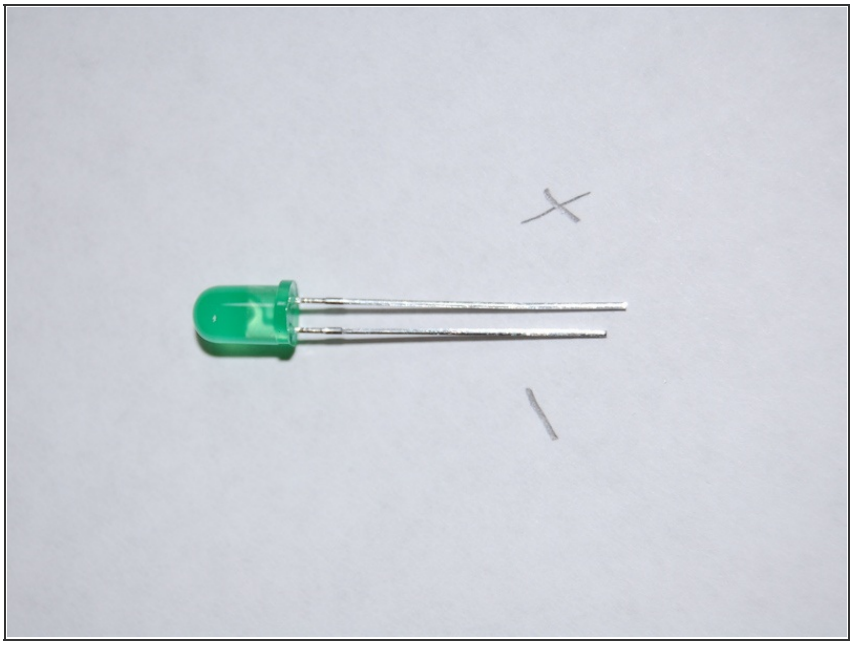
- PCB (1)
- 27 LEDs (1)
- 2 6 Pins for Arduino (1)
- 2 8 Pins for Arduino (1)
- 3 Resistors (1)
- Foam Guide (1)
- Short Wire (1)
- Medium Wire (1)
- Long Wire (1)
- Arduino Uno (1)

Step 1 — 3x3x3 LED Cube Arduino Shield



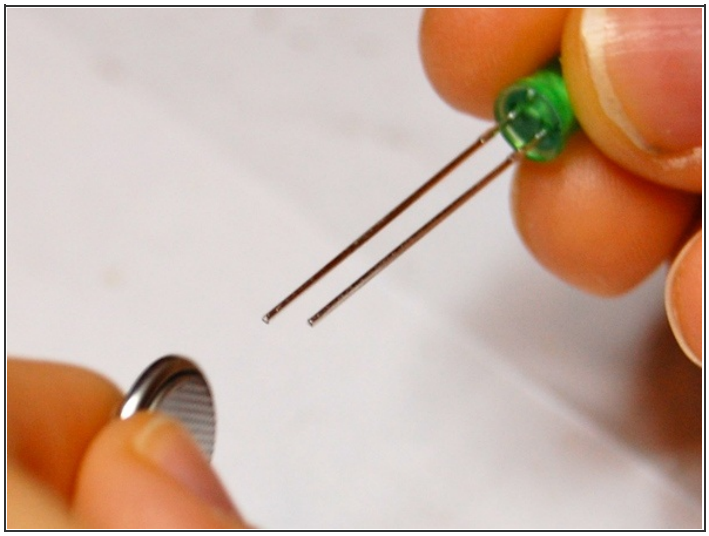
- Have fun with this beginner project!

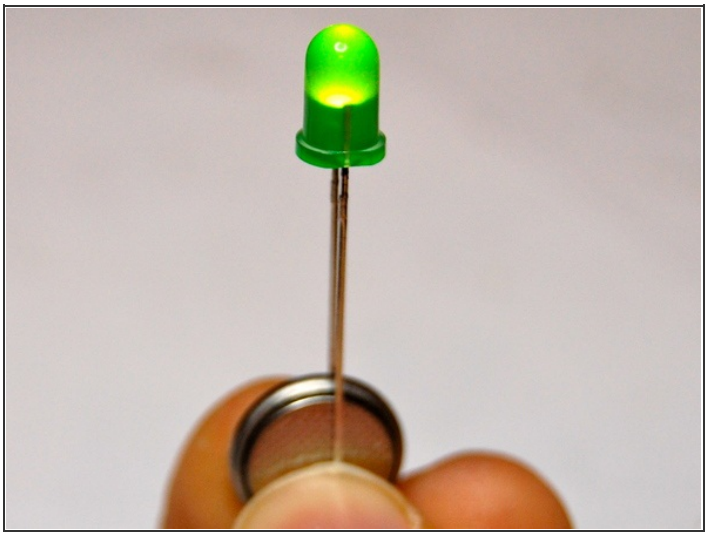
Step 2 — A little information first about LEDs



- All LEDs have a positive (+) and a negative (-) lead. As you can see in the picture, the positive (+) lead is longer than the negative (-) lead. You will always be bending the negative (-) lead. The official term for the negative lead is “cathode” and for the positive lead it is “anode.” For these directions we will use “short” and “long.”

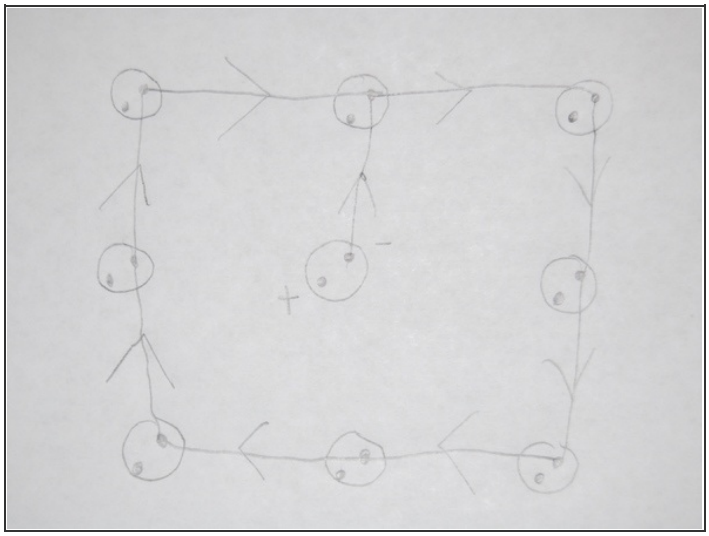
Step 3 — Testing your LEDs

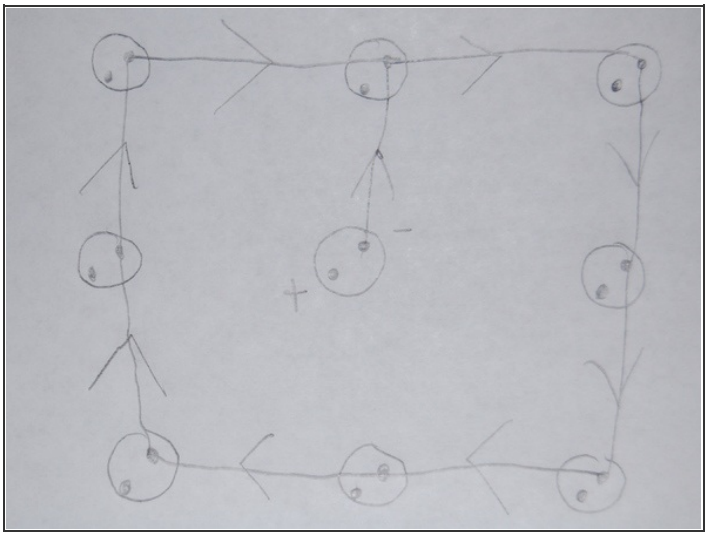




- I've tested every single LED. However if you'd like to test to make sure, here's how to do it. Take a lithium coin-cell battery, stick the LED with the long lead on the side of the battery marked with a "+" and the other lead on the other side of the battery. Press the leads against the battery. The light should turn on. If not, you've got yourself a bad LED.

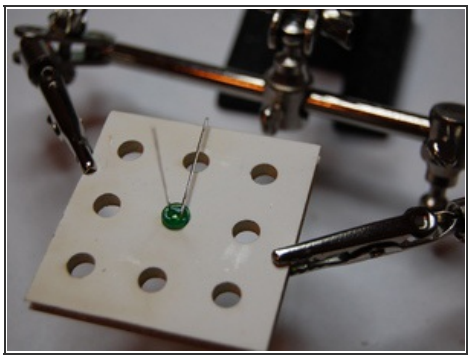
Step 4 — Guide Sheet

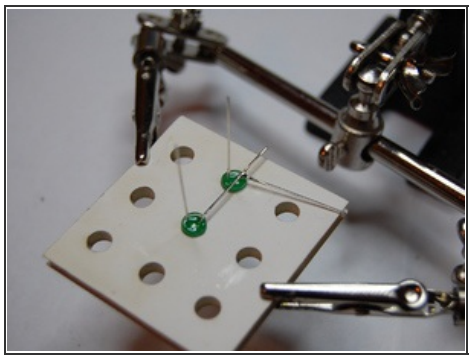


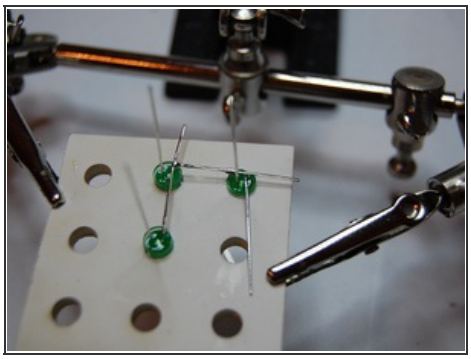


- I used this as my template. If you ever get confused (easy to do) refer back to the guide sheet. This will tell you the placement and orientation of the LEDs and how to bend their leads.
- Each circle has 2 dots. The one with the arrow is the negative (-) lead and the one standing alone is the positive (+). This diagram shows you which way to bend your negative (-) leads.

Step 5 — Connecting your LEDs

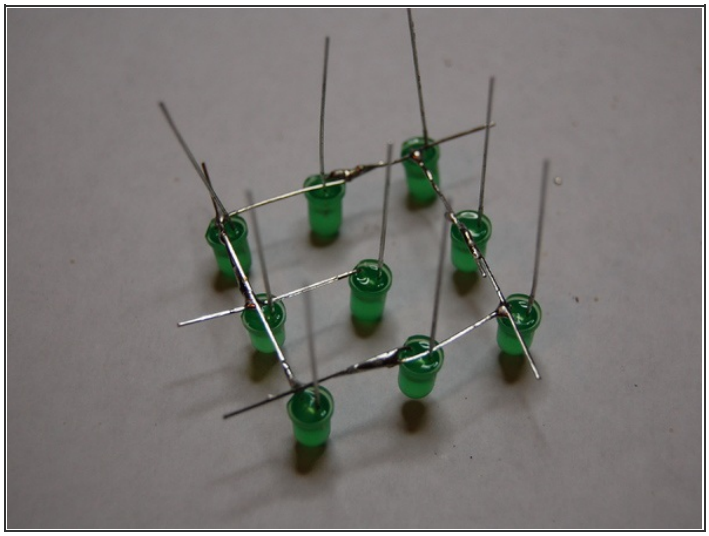


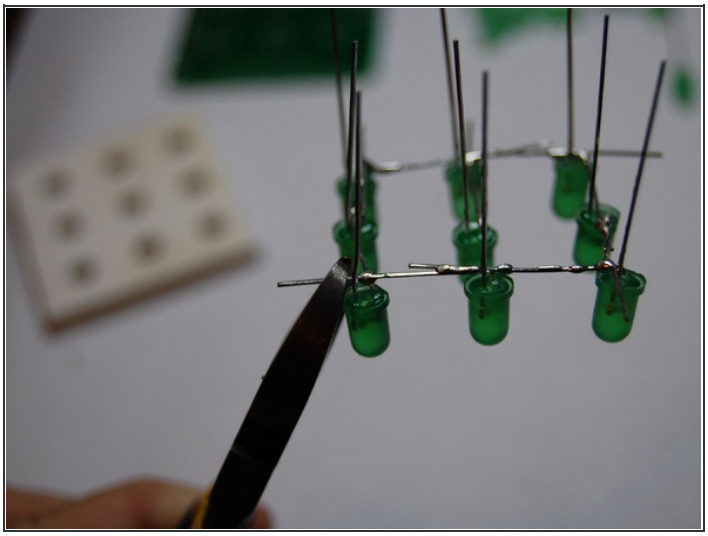




- This is an enlarged picture to show the use of the Helping Hands to hold your work.
- ALWAYS FOLD DOWN THE NEGATIVE (-) SHORTER LEAD. 1) Start with the center hole. Fold down the negative (-) lead on the right side. 2) Place the second LED in as shown. Solder them together. Don’t worry about the end of the LED being too long. We will be trimming them. 3) Place the third LED in as shown. Solder them together. Continue on until all 9 LEDs are soldered together.

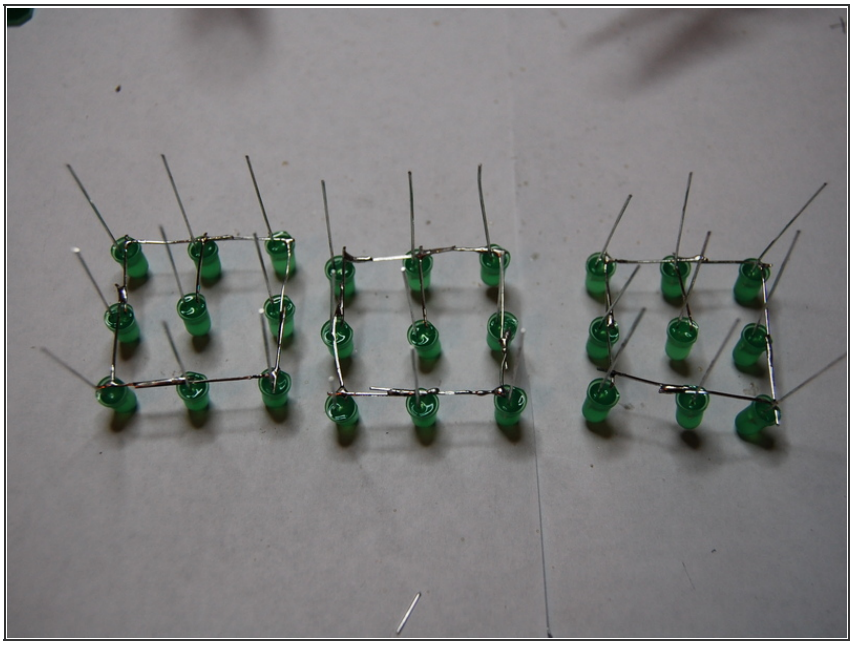
Step 6





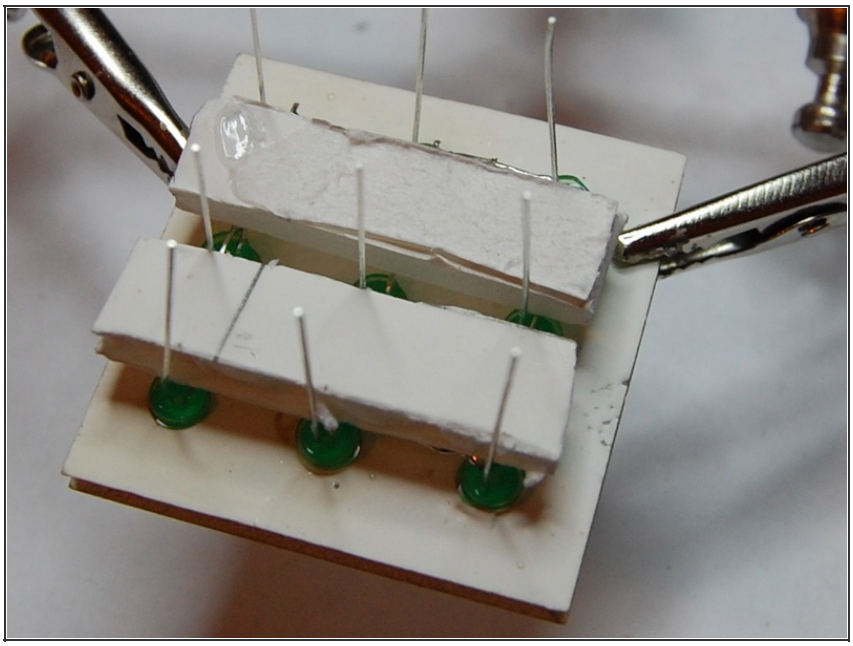
- Before cutting the extra wire, take another look to make sure all your LEDs are going the correct way and you folded down the negative (-) lead in each case. This is the time to catch a mistake; you can always unsolder and fix it. Using your wire cutters, cut off the extra wire. Mostly these should be on the 4 corners.

Step 7



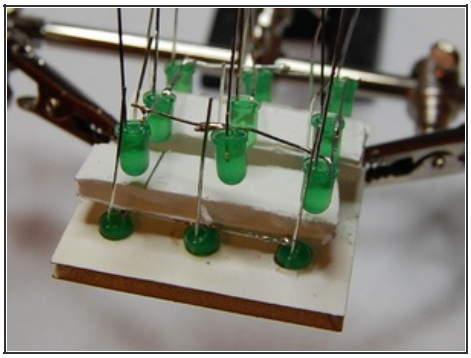
- Do the same 2 more times.
- You should have three 9-pin LED squares.

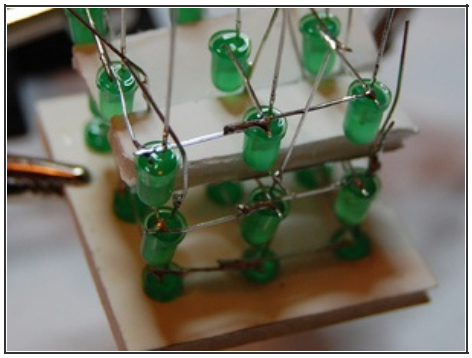
Step 8 — Solder all 3 levels together

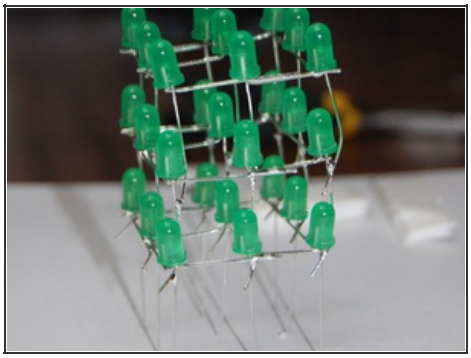


- Now the tricky part starts: stacking them together.
- Put one LED piece back into the foam. You can find something to slide in between levels as shown.

Step 9

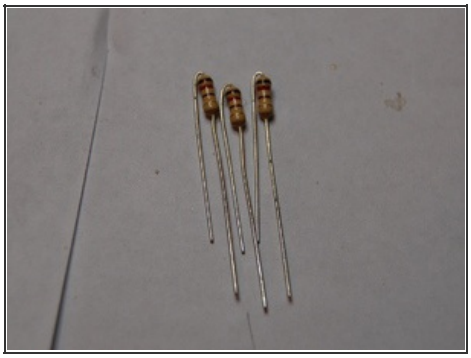
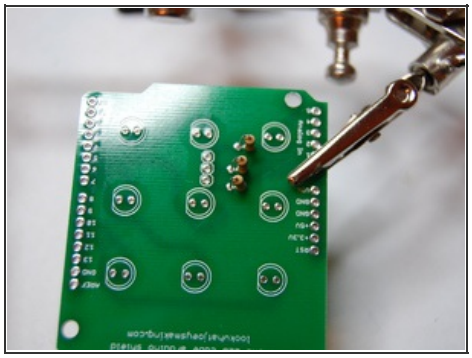
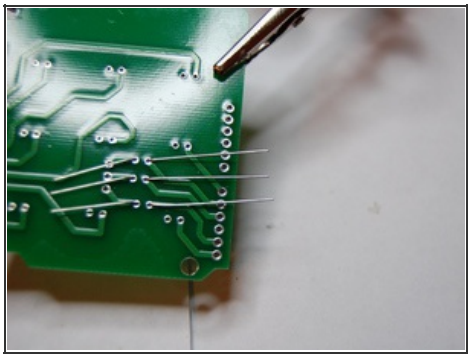






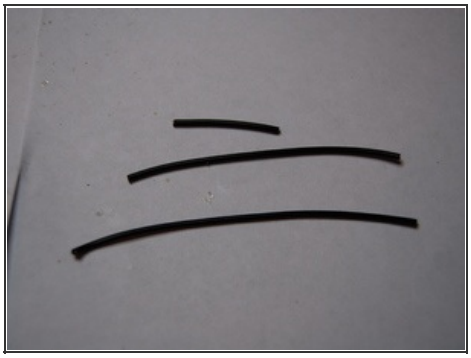
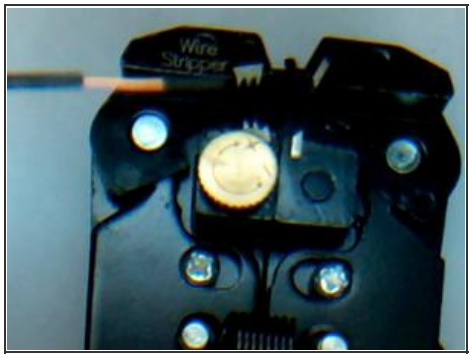
- Put your 2nd layer on. You will be soldering the positive (+) lead to the corresponding positive (+) lead on the next layer as shown. You may need to bend the wires so they meet.
- Please note that the picture above is showing how to stack the layers. They have not been soldered together. If you connect one positive (+) to a negative (-) your LED will not light up in the end.
- Do the same with the 3rd layer.
- This is what you should have in the end. This is the one my mom did; a little crooked, but that's OK. As long as all the soldering is good the LEDs will still shine. Set your LED "cube" off to the side. Let's work on the PCB.

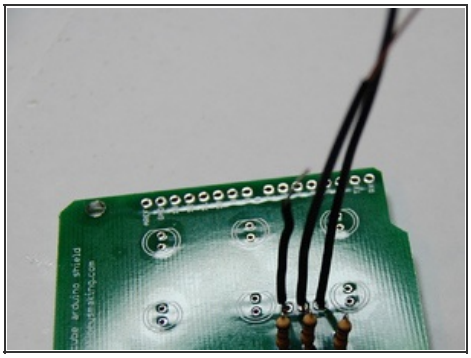
Step 10 — Resistors

- The Resistors come with their leads straight. You need to bend them as shown. There is no polarity (+ or -) to these, so you don't have to bend a particular wire. Just bend either one down.
- Place each resistor into the board. Solder each in on the back of the PCB. There is no right or wrong way for these. I prefer to have mine going in the same direction.

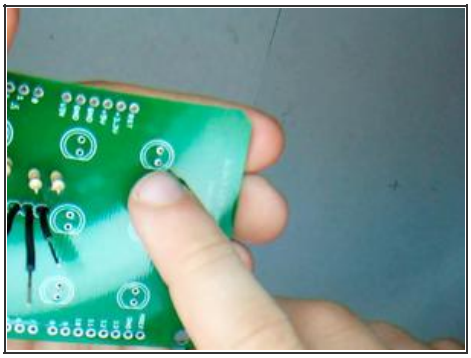
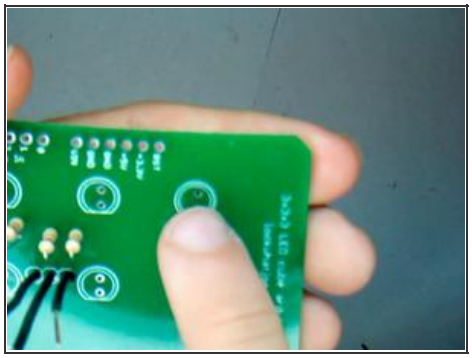
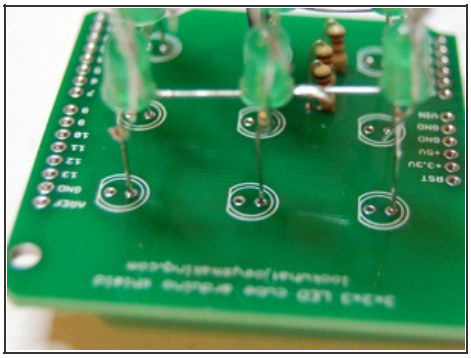
Step 11 — Three black wires



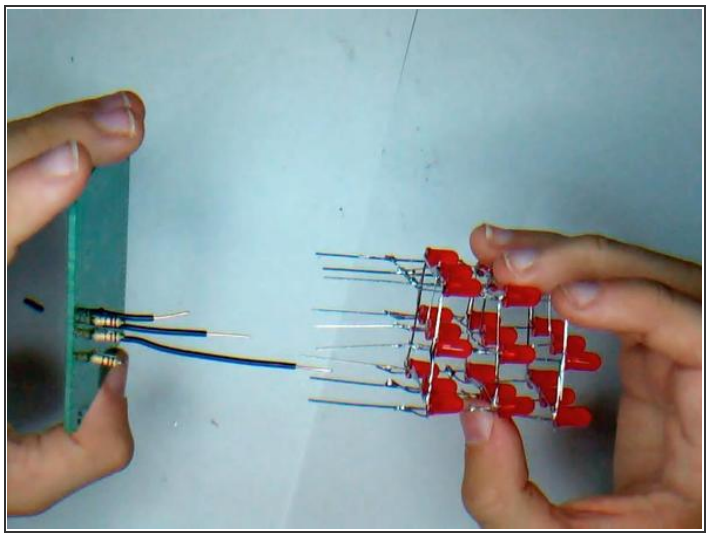
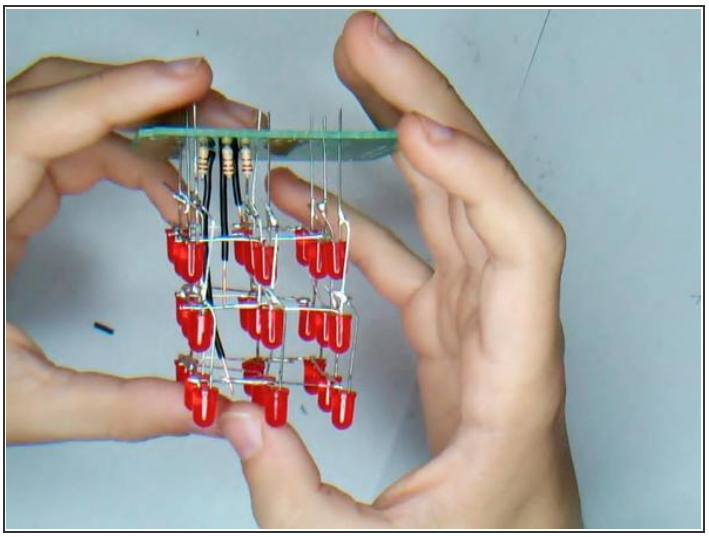
- You will need to take your wire strippers and strip off a bit of insulation at each end. You will be soldering the top and the bottom, so strip off enough to do so. You may also choose to strip off all the black insulation. Either way is fine.
- Place the wires in each hole starting with the smallest and working up to the tallest. Small goes in the 1st hole, medium in the 2nd hole and large in the 3rd hole. Solder on the backside.

Step 12 — Put the whole cube onto the shield PCB

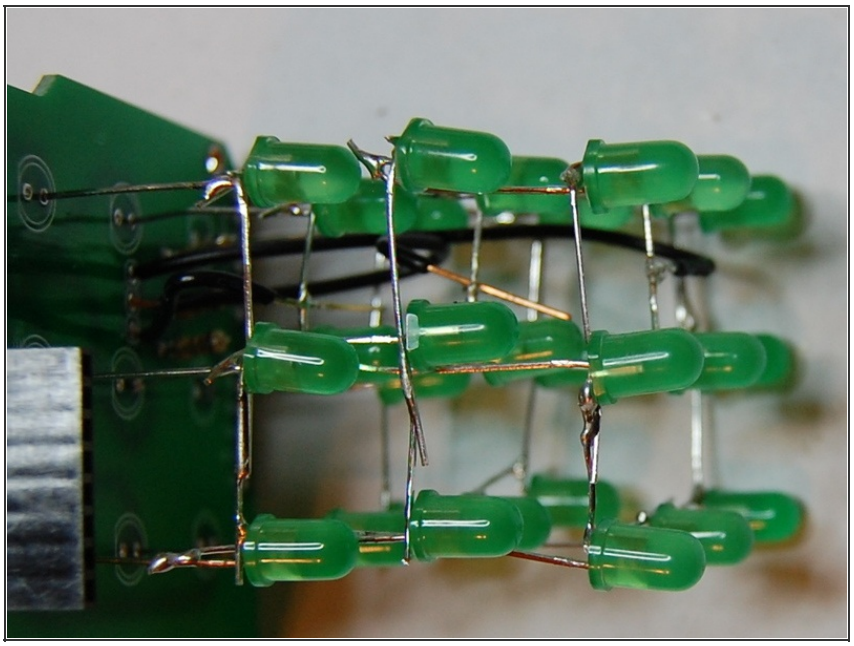
- Almost finished. Let's put the cube onto the PCB. This part is also tricky; just take your time. It will work in the end!
- Picture 1 is showing that there are 2 holes; you only have 1 wire. Picture 2 is showing which hole you should use. Picture 3 is showing the wires in the correct holes. You can flip the PCB over and you will notice that only one of the holes on the back has a connection.

Step 13

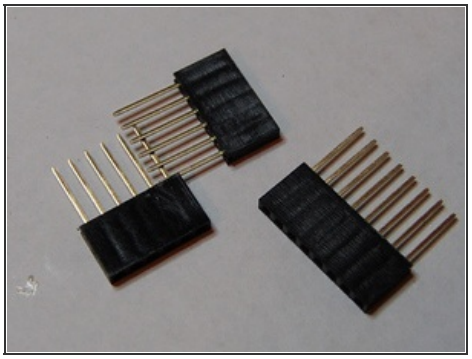
- Take your time and get each wire into the correct hole. It's kinda like a puzzle. Once you've succeeded in doing that, solder the wires in place on the back side. Then give yourself a pat on the back!

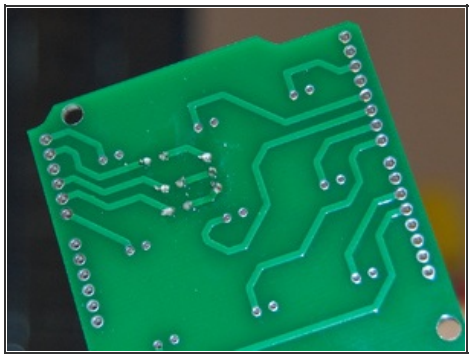
Step 14 — Make the connection with your black wires

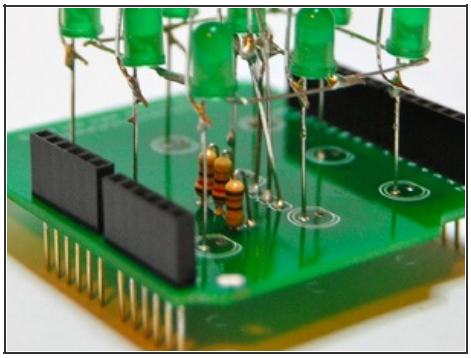


- Look at your black wires. You need to solder each of them to the correct level. First look for the very first LED you put into the foam. This is the wire you will solder to the negative (-) leads. Solder your short black wire to the negative (-) lead of the LEDs on the bottom level. Solder your medium black wire to the negative (-) lead of the LEDs on the second level. Solder your long black wire to the negative (-) lead of the LEDs on the top level.
- You may have some extra wire. I couldn't get my wire cutters into the cube, so I left mine alone.

Step 15 — Arduino connectors

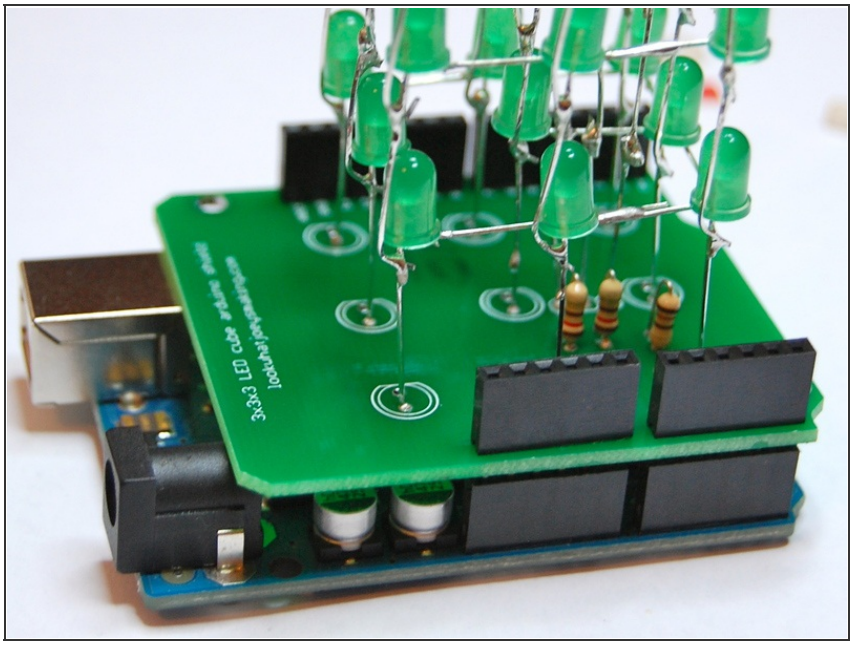






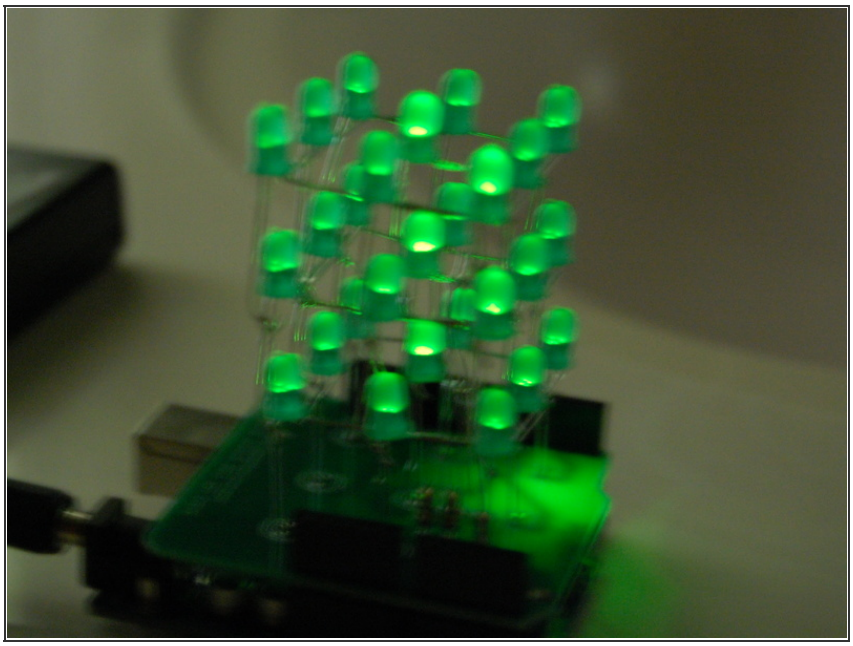
- As you can see there are 2 connectors with 6 pins and 2 with 8 pins.
- If you look on your PCB one side will have two 6-pin slots and the other side will have two 8-pin slots. You will be soldering them in on the bottom. You WILL NOT cut off the extra wire. That wire is used to hook into your Arduino.
- This is what your Arduino connectors should look like when installed.

Step 16 — Your Arduino



- Hook your new 3x3x3 Cube Arduino Shield into your Arduino. Be careful. Keep an eye on your pins and line them up perfectly. If you didn't solder them in just right, you may need to bend them a bit. It may be hard hooking them together the first couple of times.

Step 17 — Connecting your Arduino to your computer



- Connect your Arduino to your computer. Install the test code, found here. You can also find this under the 3x3x3 Codes tab on the main page of my website. You should see all the LEDs go on. I usually take mine into the bathroom – nice and dark!
- Try more codes. Make your own. Take some pictures and share. Have fun and be patient. Credit given to Mitch Altman.

If you need some more information you can check out http://lwjm.us

But most importantly - have fun! :)

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